STUDY OF THE FIELD EMISSION PROPERTIES OF CARBON NANOTUBES GROWN ON SULFUR DOPED NANOCRYSTALLINE DIAMOND FILMS

Kishore Uppireddi, Fabrice Piazza

Dept of Physics, University of Puerto Rico, Puerto Rico, PR 00931, USA

Gerardo Morell

Dept of Physical Sciences, University of Puerto Rico, Puerto Rico, PR 00931, USA

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Abstract

The electron field emission (EFE) properties of carbon nanotubes (CNTs) grown on sulfur-doped nanocrystalline diamond (n-D:S) films were investigated. These two materials show excellent EFE properties separately. The CNTs and sulfur-doped nanocrystalline diamond films were synthesized in the same hot filament chemical vapor deposition (HFCVD) system at relatively low methane concentrations (1-2%). The effect of growth process parameters of CNTs and sulfur incorporation in the nanocrystalline diamond films on the field emission properties were studied. Their morphology and structure were characterized by SEM, energy filtered TEM and Raman spectroscopy. The dependence of EFE properties on composition and morphology is discussed.

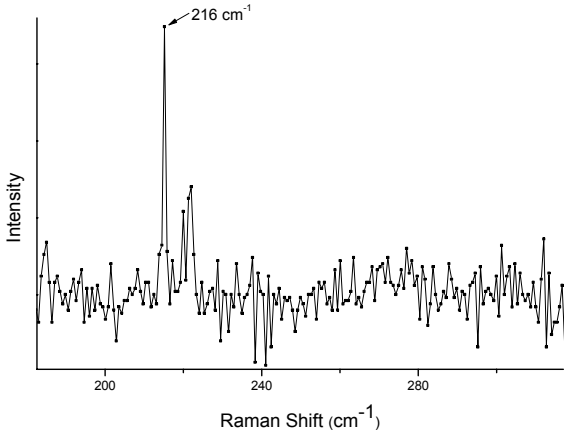

Figure 1. Radial breathing mode of multiwall CNTs measured by visible Raman Spectroscopy.

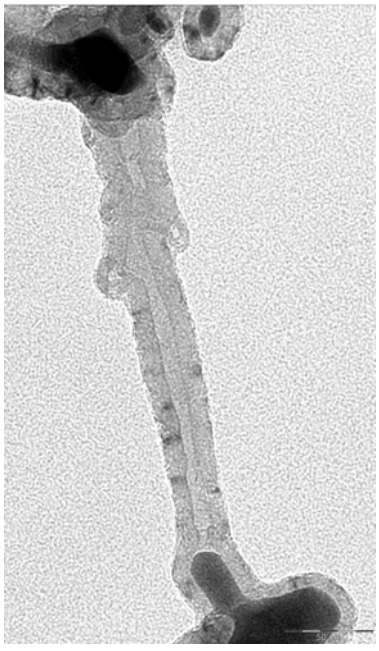

Figure 2. High resolution TEM of a multiwall CNT

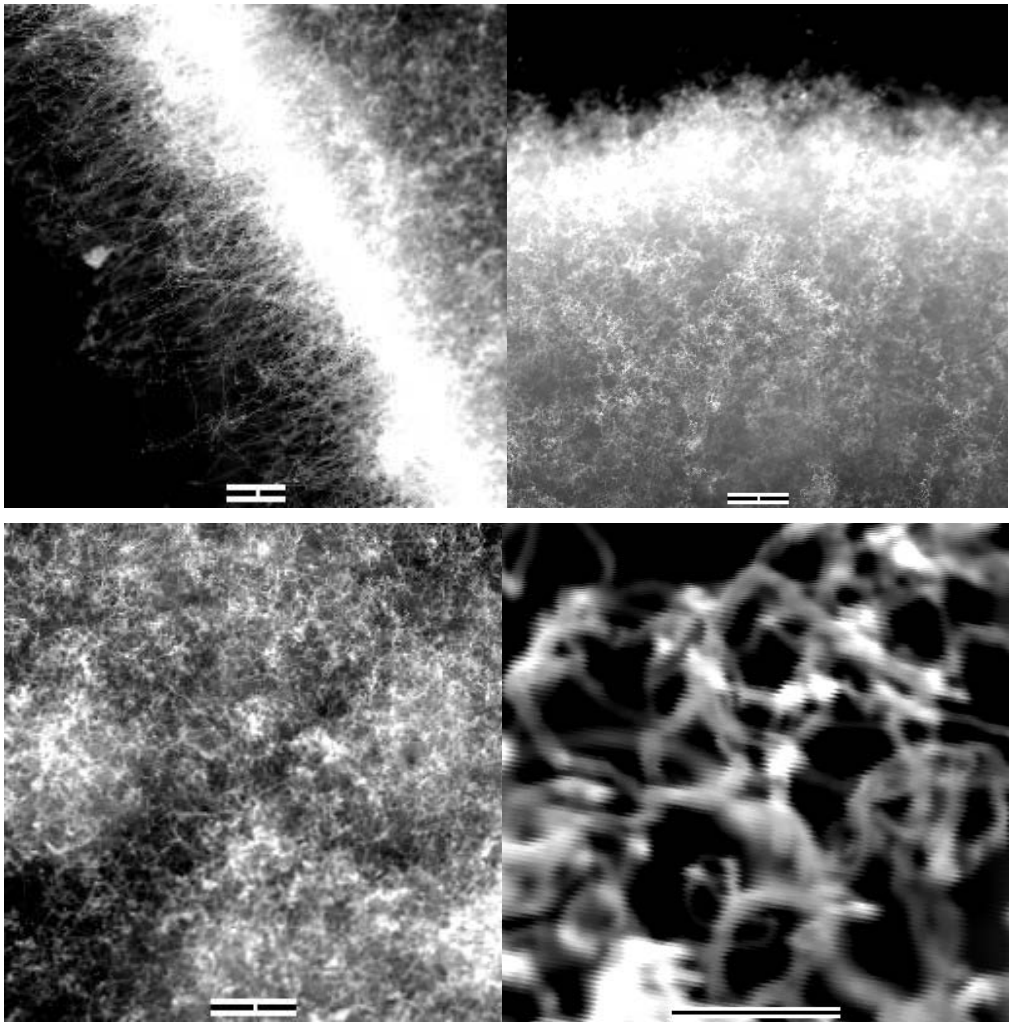

Figure 3. SEM images of CNTs grown by HFCVD: upper left - edge view; upper right – side view; lower left – top view; lower right – zooming.

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